**Building the Erie Canal[[1]](#footnote--1)**

If you had suggested to anyone in 1783, at the end of the American War of Independence, that New York would one day be the greatest city in the world, you would possibly have been marked out as a fool. New York’s prospects in 1783 were not promising. It had housed more Loyalists than any other city, so the war had had an unhappy effect on its standing within the new republic. In 1790, its population was just ten thousand. Philadelphia, Boston, and even Charleston were all busier ports.

The state of New York had just one important advantage—an opening to the west through the Appalachian Mountains, the chain that runs in rough parallel to the Atlantic Ocean. It is hard to believe that those
soft and rolling mountains, often little more than big hills, could ever have constituted a formidable barrier to movement, but in fact they afforded almost no usable passes along the whole of their twenty-five-hundred-mile length and were such an obstruction to trade and communications that many people believed that the pioneers living beyond the mountains would eventually, of practical necessity, form a separate nation. For farmers it was cheaper to ship their produce downriver to New Orleans, via the Ohio and Mississippi rivers, then by sea around Florida and up the Atlantic seaboard to Charleston or one of the other eastern ports—a distance of three thousand miles or more—than it was to haul it three hundred miles overland across
the mountains.

But in 1810, DeWitt Clinton, then mayor of New York City and soon to become governor
of the state, produced an idea that many thought was possibly mad but certainly delusional. He proposed building a canal across the state to Lake Erie, connecting New York City with the Great Lakes and the rich farmlands beyond. People called it Clinton’s Folly, and not surprisingly. The canal would have to be dug with picks and shovels, to a width of forty feet, through 363 miles of rough wilderness. It would need eighty-three locks, each ninety feet long, to manage all the changes of elevation. Along some stretches the slope would have to average no more than one inch per mile. No canal of even close to this degree of challenge had ever been attempted anywhere in the settled world, much less in a wilderness.

And here was the thing. America didn’t have a single native-born engineer who had ever worked on a canal. Thomas Jefferson, who normally venerated ambition, thought the whole idea insane. “It is a splendid project, and may be executed a century hence,” he allowed after reviewing the plans, but added at once: “It is little short of madness to think of it at this day.” President James Madison refused to give federal aid, at least partly motivated by a desire to keep the center of commercial gravity farther south and away from that old Loyalist stronghold.

So New York’s options were to go alone or go without. Despite the costs, risks, and almost total absence of necessary skills, it decided to fund the project itself. Four
men—Charles Broadhead, James Geddes, Nathan Roberts, and Benjamin Wright—were appointed to get the work done. Three of them were judges; the fourth was a schoolteacher. None had ever even seen a canal, much less tried to build one. All they had in common was some experience of surveying. Yet somehow through reading, consultation, and inspired experimentation, they managed to design and supervise the greatest engineering project the New World had ever seen. They became the first people in history to learn how to build a canal by building a canal.

Early on, it became apparent that one problem threatened the viability of the whole enterprise—a lack of hydraulic cement. Half a
million bushels of hydraulic cement (a bushel is thirty-two U.S. quarts or about thirty-five liters, so half a million bushels is a lot) were needed to make the canal watertight. If water seeped away on any section, it would be a disaster for the whole canal, so clearly it was a problem that had to be fixed. Unfortunately, no one knew how to overcome it.

A young canal employee named Canvass White volunteered to travel to England at his own expense to see what he could learn. For nearly a year White walked the length and breadth of Britain—two thousand miles in all—studying canals and learning all he could about how they were built and kept together, with a particular eye on waterproofing. By chance, it turned out that Parker’s Roman
cement worked unexpectedly well as a hydraulic cement, where it needed only to be used as a water-resistant mortar. Its inventor, the Reverend Mr. Parker of Gravesend, didn’t grow rich from this, unfortunately, as he sold his patent within a year of taking it out, and then, rather ironically, emigrated to America, where he soon died. His cement, however, did very well till it was superseded by superior varieties in the 1820s, and gave Canvass White hope to suppose that he might come up with something similar using American materials.

Returning home, and now armed with some knowledge of the scientific principles of adhesion, White experimented with various native ingredients and quickly formulated a compound that worked even better than Parker’s Roman cement. It was a great moment in American technological history—indeed, it could be said to be the beginning of American technological history—and it deserved to make White rich and celebrated. In fact, it did neither. White’s patents entitled him to a royalty of four cents on each bushel sold—a small enough sum as it was—but the manufacturers declined to share their profits. He pressed his claims through the courts but was unable to enforce any judgments that went his way. The result
was a long slide into penury.

The manufacturers, meantime, grew rich making what was now the best hydraulic cement in the world. Thanks in large part to White’s invention, the canal opened early, in 1825, after just eight years of construction. It was a triumph from the start. So many boats used it—thirteen thousand in the first year—that at night their running lights looked like swarms of fireflies on the water, according to one captivated witness. With the canal, the cost of shipping a ton of flour from Buffalo to New York City fell from $120 a ton to $6 a ton, and the carrying time was reduced from three weeks to just over one. The effect on New York’s fortunes was breathtaking. Its share of national exports
leaped from less than 10 percent in 1800 to over 60 percent by the middle of the century; in the same period, even more dazzlingly, its population went from ten thousand to well over half a million.

Probably no manufactured product in history—certainly none of greater obscurity—has done more to change a city’s fortunes than Canvass White’s hydraulic cement. The Erie Canal secured the economic primacy not only of New York within the United States but also, very possibly, of the United States within the world. Without the Erie Canal, Canada would have been ideally positioned to become the powerhouse of North America, with the St. Lawrence River serving as the conduit to the Great Lakes and the rich lands
beyond.

So the great unsung Canvass White didn’t just make New York rich; more profoundly, he helped make America. In 1834, exhausted by his legal battles and suffering from some serious but unspecified malady—probably consumption—he traveled to St. Augustine, Florida, in the hope of restoring his health; unfortunately, he died there soon after arriving. He was already forgotten by history and so poor that his wife could barely afford to bury him. And that is probably the last time you will ever hear his name.

1. Bryson, Bill (2010-10-05). At Home: A Short History of Private Life (p. 191-194). Random House, Inc.. Kindle Edition. [↑](#footnote-ref--1)